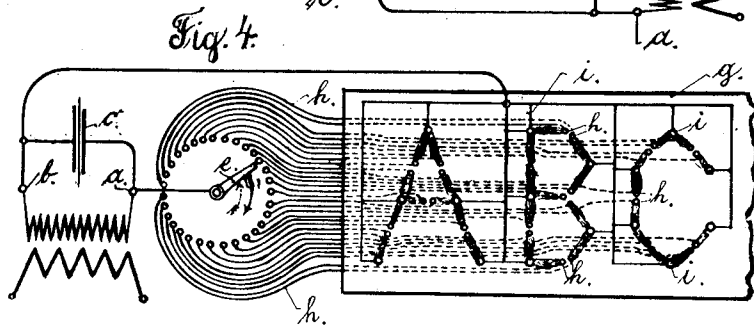
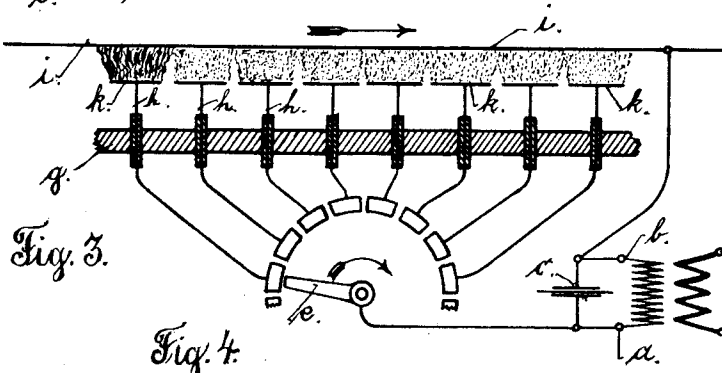
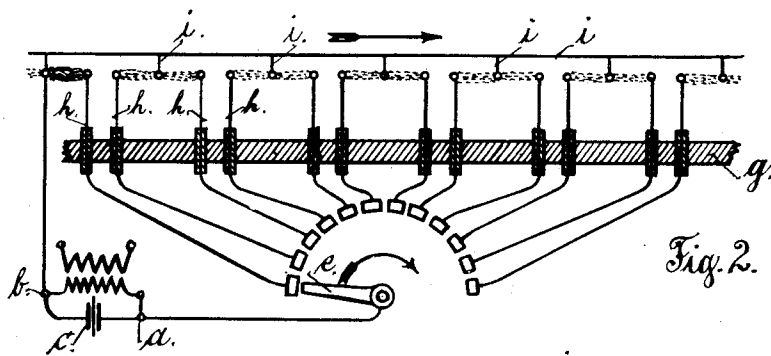
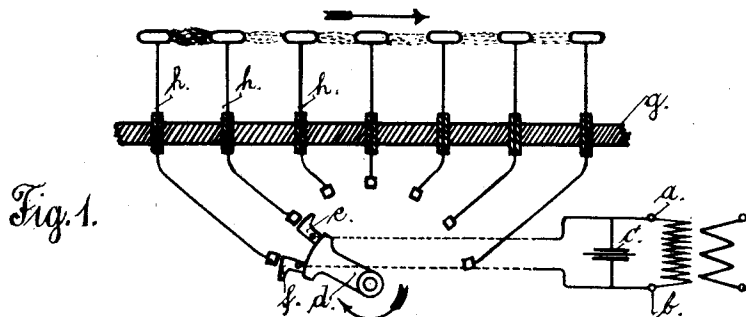


A. LASZLO.
ELECTRICAL DISPLAY APPARATUS.
APPLICATION FILED MAR. 7, 1912.

1,195,239.

Patented Aug. 22, 1916.

4 SHEETS—SHEET 1.



Witnesses:
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4 SHEETS—SHEET 2.

Fig. 5.

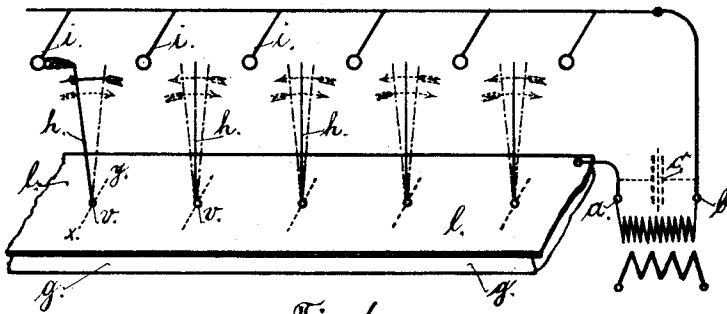


Fig. 6.

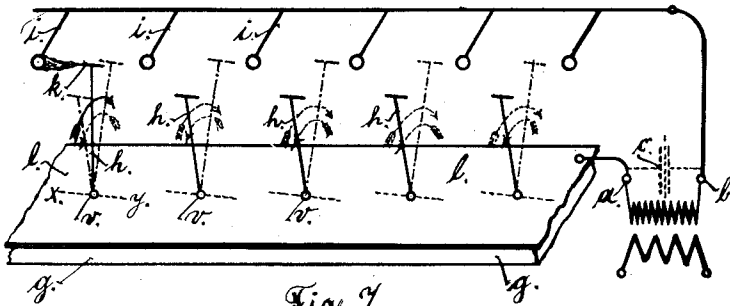


Fig. 7.

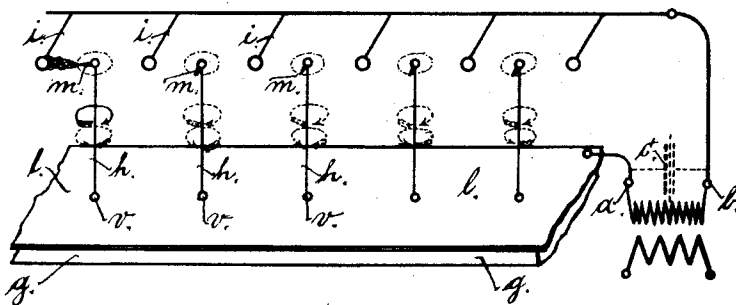
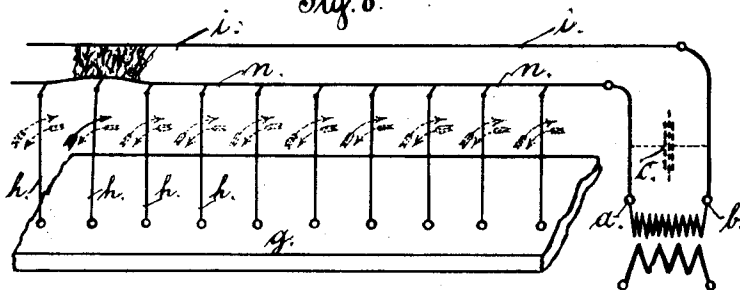


Fig. 8.



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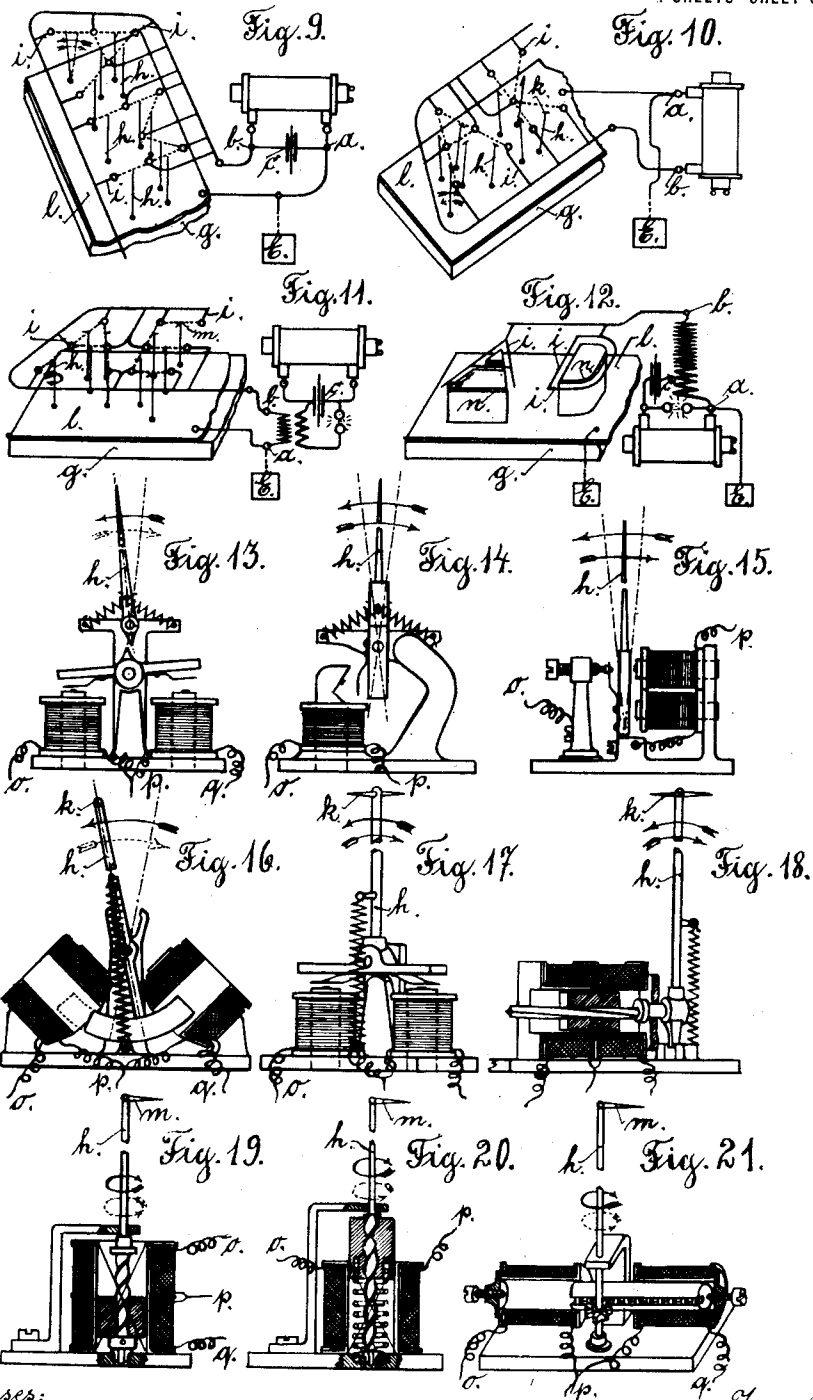
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4 SHEETS—SHEET 3.

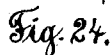
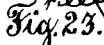


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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL-DISPLAY APPARATUS.

1,195,239.

Specification of Letters Patent.

Patented Aug. 22, 1916.

Application filed March 7, 1912. Serial No. 682,287.

To all whom it may concern:

Be it known that I, ANTON LASZLO, electrical engineer, a subject of the King of Hungary, and residing at 27 Dernburgstrasse, Charlottenburg, near Berlin, Germany, have invented certain new and useful Improvements in Electrical-Display Apparatus, of which the following is a specification.

When hitherto the effects of the electric discharges consisting of the compensating sparks of high tension or also high frequency currents, were to be utilized in practice in form of luminous letters, words, figures and the like, the disadvantage was encountered, that these letters consisted in reality of a plurality of spark gaps connected in series. Between each two sparks there was the dark conductor. This is also shown by the arrangement of the so-called lighting board or lighting tube. When the inscriptions are of a great length, the number and length of the dark conductor sections is very considerable, even if the tension is raised very much. When seen from a distance the single sparks will appear as luminous points only.

The present invention now relates to an arrangement for producing electrically luminous letters, words, lines, figures and the like by means of high tension discharges, by which method it is made possible to retain the effect of a general illuminating spark even if the discharge has the shape of letters or any other figure. The lines forming the letters or figures are divided into sections of substantially equal length. Each of these sections forms the path for the spark gap in the air. The spark at each section is not continuous but intermittent and the sparks form a plurality of sections do not make and break simultaneously but in succession one after the other so that the illumination runs along the line of gaps and then back or over again. There are thus produced a series of flashes throughout the line or figure following each other in such rapid sequence that the image of the beginning of one flash has not time to fade from the retina of the eye before the succeeding flash across the same gap replaces it. If the period during which all these sections have acted as spark gaps is sufficiently short, the human eye will see all sections of the letters, words, figures and the like at one time, even with the largest luminous signs, in form of lines of a continuous flash of

lighting. By my invention the length of the spark to be set up and maintained is greatly reduced as the whole of the electromotive force is applied to only a part of the line at a time; the conductor sections, no longer necessary to reduce the total voltage consumed, are reduced to a minimum; the full power of the current is concentrated on a small part of the line and greatly increases the brightness of the sparks and total illumination to the eye, while the practical disappearance of the conductor sections from the sign leaves the bright alternating waves of light to sweep along the sections in rapid flashes that seem to bridge the slight gaps between the sparks and produce on the eye an impression of a continuous line of light. It is not necessary for the several sections to be filled out by discharge sparks so that the direction of the sparks coincides with the line forming the letters or figures; on the contrary the sparks may have any direction accordingly as it will suit the purpose and the structure of the sign.

In the accompanying drawings arrangements are exemplified, in a diagrammatical manner, which are adapted for carrying out the hereinbefore described method.

Figures 1, 2 and 3 illustrate several methods of carrying out my invention; Fig. 4 illustrates my invention as applied to the illumination of letters, symbols, or the like; Figs. 5 to 8 illustrate further methods of carrying out my invention; Figs. 9, 10, 11 and 12, indicate diagrammatically the application of illuminating signs in accordance with the methods respectively shown in Figs. 5, 6, 7 and 8; Figs. 13 to 18 are detail views of various electromagnetic means for vibrating a discharger element; Figs. 19, 20 and 21 are detail views of various devices for rotating a discharging element; Figs. 22 and 23 are detail views of various devices for causing a flexible discharge element to be set in wave movement; Fig. 24 illustrates the application of my invention to the illumination of signs, or the like, in accordance with the principle illustrated in simpler form in Figs. 7 and 11; Fig. 25 represents an arrangement for illuminating successively any desired letter, or the like, in accordance with my invention; and Fig. 26 is a detail view diagrammatically showing the simultaneous illumination of a plurality of letters, or the like, in accordance with my invention,

by the specific use of mechanical means for rotating certain of the discharger elements.

The dischargers *h* are connected to the contacts of a switch device comprising the rapidly rotating or oscillating contact *d*, which has, according to Fig. 1, two contact points *e* and *f*. Each two neighboring dischargers are thus intermittently connected by the terminals *a* and *b* to the source of the high tension or high frequency current.

In Fig. 2 the dischargers *i* are permanently in connection with each other and besides with the one pole *b* of the source of the high tension or high frequency current. The discharges will occur only from such dischargers *h*, to which the rotating contact *e* according to its momentary position conducts the current.

The arrangement according to Fig. 3 is similar to that shown in Fig. 2, except, in this instance, the path of the spark gap is vertical to the direction of the lines forming the letters or figures. The dischargers *i* are preferably made in form of a bar, while the dischargers *h* terminate in conductors *k* parallel to said bar. According to the connections shown in Fig. 3 the spark discharges will wander from left to right when the contact *e* swings to the right.

Fig. 4 illustrates the application of the present invention for producing letters. When the contact *e* is rotated the sparks will vividly jump to and from the terminals *h* outlining the letters. The rapidity with which this occurs produces the impression on the eye, as if the whole inscription flashes up at the same instant. Otherwise, the connections are similar to those according to Fig. 2. The condensers *c* are arranged in the high frequency circuit; *g* indicates the base plate, signboard or the like.

In accordance with Figs. 5 to 8, inclusive, the base plate *g*, a sign board or the like is provided with movable dischargers *h*, which are connected with each other by means of the metallic plate or bar *l*. The latter is connected to the one pole *a* of the source of the high tension or high frequency current. Between the dischargers *h* are arranged dischargers *i* which latter are connected with each other and with the second pole *b* of the source of the high tension or high frequency current. The tension of the sources of the high tension or high frequency current is so adjusted, that, when the dischargers *h* are at rest, no spark is emitted.

In Fig. 5 one of the dischargers *h* oscillates so that it alternately approaches the neighboring discharger *i*. The distance between the dischargers becomes smaller than the critical spark gap and a spark discharge occurs between *i* and *h*. The dischargers oscillate singly and alternately one after

each other, so that the whole distance from the end of *i* and *h* appear as a continuous sparking line. On or over the base *g* are provided devices *v*, which oscillate the dischargers *h* by either mechanical or electric means as shown in Figs. 13, 14 and 15. At the top end of the dischargers *h* in Fig. 6 is fitted a bridge *k*. The alternating oscillations of the dischargers *h* from their position of rest occur on the axis *x-y*, this axis *x-y* being at a small angle to the line in which are arranged the ends of the dischargers *i*.

In Fig. 7 the dischargers *h* have a rotary movement around their longitudinal axis. Each of these dischargers carries at its end a tongue *m* which produces the discharges which take place alternately with the adjacent dischargers *i*, as the tongue *m* is rotated by the device *v*.

In Fig. 8 a metallic band *n* is moved in an undulating manner, by the dischargers swinging alternately back and forward. The sparks will pass over between *i* and *n* where the distances between the two is smallest at the successive instants.

The Figs. 9, 10, 11 and 12 illustrate how the discharges appear when the dischargers *i* are arranged to form letters, the letters being indicated by the dotted lines. The arrangements are otherwise the same as shown in Figs. 5, 6, 7 and 8.

In Figs. 13, 14, 15 electric devices are exemplified, which may be employed for oscillating the dischargers *h* according to Figs. 5 and 9. These devices are indicated at *v* in Fig. 5. These devices are operated by short current impulses sent through the wires *o*, *p* or *q* respectively.

In Figs. 16 and 17, I have shown magnets arranged to oscillate the discharger element *h* carrying the bridge portion *k* at its end. Upon alternately energizing the circuits *o*, *p* and *q*, the magnets will be alternately energized and produce the desired oscillation.

In Fig. 18, I have shown two magnets connected in the respective circuits *o*, *p* and *q*, which magnets are arranged on the same axis and acting upon a common reciprocatory magnetic core piece having a spiral engagement with the discharge member *h* carrying the bridge portion *k* at its end.

Figs. 19 and 20 illustrate specific forms of devices for rotating the discharge element *h* carrying the tongue *m*. As will be apparent from the drawing, the two axially arranged magnets energized by the respective circuits *o*, *p* and *q*, act upon a common reciprocatory magnetic core piece in spiral engagement with a portion of the discharge member *h*, whereby upon alternate energization of the two magnets, the tongue *m* will be rotated for a certain time in one direction and for another certain time in the opposite direc-

tion. In Fig. 20, a single magnet is shown which is energized by the circuit *o, p*. During such energization, the reciprocatory core piece, in spiral engagement with the discharge member *h*, will cause the tongue *m* to be rotated in one direction. When the magnet is deenergized the spring will force the core piece upwardly and rotate the tongue *m* in the opposite direction.

10 In Fig. 21, I have shown two magnets energized by the respective circuits *o, p* and *p, q*, acting upon a common reciprocatory core piece provided with a ratchet meshing with a pinion on the rotating discharge member *h* carrying the tongue *m*. Upon energization of one magnet, the tongue *m* will be rotated in one direction, and upon energization of the other magnet, the tongue *m* will be rotated in the opposite direction.

20 Adjusting screws are provided for determining the limits of movement of the core piece, and thereby limit the angle of rotation in either direction of the tongue *m*.

In Fig. 22, I have illustrated a plurality of magnets spaced laterally from each other, and having their axes parallel to one another. Each magnet, energized by the respective circuits *o, p*, acts upon a reciprocatory core piece connected to a portion of the flexible metallic band *n*. When the magnet is deenergized, the spring restores the core piece to its initial position.

In Fig. 23, the respective magnets act upon oscillatory armatures connected to successive portions of the flexible metallic discharge conductor *n*. The connections of the parts will be clear from the above descriptions, particularly the description of Figs. 8 and 12.

40 Fig. 24 shows a signboard bearing the letters B L I T Z. The dischargers *h* are here employed as rotary dischargers, arranged in accordance with Figs. 7 and 11. As a means for rotating the dischargers *h* a device is supported to be employed as is exemplified in Fig. 20, and from which it is evident that, say, a solenoid draws in an iron core, whereby the spindle of the discharger is rotated in a manner similar to that of a twist drill.

50 The ends *o* of all the coils are connected to the grounded metallic plate *l*, while all the other ends *p* lead to contacts of a switching arrangement of a suitable design. By the rotation of lever *s* all dischargers *h* will successively and alternately form a part rotation around an angle of 180 degrees. The current for exciting the solenoids may be taken from say a storage battery *r*. The whole of the dischargers *h* may be connected to a common wire netting which is fastened (as shown by dotted lines) over the base plate.

Fig. 25 represents the panel of any letter when rotary dischargers *h* are employed. By means of suitably combined switch de-

vices it is possible to alternately produce any letter of the alphabet by apparently combined spark paths in the same panel.

In Fig. 26 the rotary dischargers are mechanically rotated say by means of cams *t* racks and pinions *u*.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. The combination with a series of permanently separated spark gap terminals arranged in desired form, of means for producing high potential oscillating spark discharges across said gaps one after another and repeating said discharges within an interval such that said entire form is illuminated within the time of fatigue of the human eye.

2. The combination with a plurality of pairs of permanently separated spark discharging terminals arranged to produce designs, of a source of high potential alternating current, and means for controlling the supply of current to selected pairs of said terminals to cause the spark discharges between said terminals to outline said designs.

3. The combination with a source of high tension voltage, of a plurality of spark discharging terminals arranged in multiple to form a continuous line of permanent spark gaps, and means for controlling the connections of said source to cause oscillating spark discharges across said gaps in predetermined order to produce the effect of a continuous linear spark.

4. The combination with a plurality of spark discharging terminals arranged to form a continuous line of spark gaps, of means for casting high potential oscillating spark discharges across said gaps in predetermined order and repeating said discharges at intervals less than the time of fatigue of the human eye, said means comprising electrostatic capacity in parallel across said gaps.

5. The combination with a source of high potential oscillating current, of a linear series of spark discharging terminals, and means for controlling the supply of current from said source to said terminals in predetermined order such that said terminals discharge sparks to the adjacent terminal or terminals so as to produce the effect of a continuous linear spark.

6. The combination with a source of high frequency or high potential alternating current, of a plurality of spark discharging terminals arranged to optically effect the desired illuminated indication, means for moving certain of said terminals relatively to the others, and means for connecting said source to said terminals.

7. The combination with a source of high frequency alternating current, of permanently separated spark gap terminals con-

nected to said source and arranged in desired form, and means for producing relative movement between said terminals to cause spark discharges at different parts of said form in succession, said means repeating said discharges within the period of fatigue of the human eye.

8. The combination with a plurality of permanently separated spark discharging terminals arranged to form a continuous line of spark gaps, a source of high tension voltage and means for oscillating certain of said terminals to cause spark discharges across contiguous gaps in predetermined sequence so as to produce the effect of a continuous linear spark.

9. The combination with a base, of movable discharge terminals mounted thereon, a plurality of discharge terminals forming sets with said movable discharge terminals

respectively, a source of high frequency or high potential alternating current, and means for intermittently energizing said sets of terminals.

10. The combination with a source of high frequency or high potential alternating current, of a plurality of spark discharging terminals arranged to optically effect the desired illuminated indication, and means for intermittently energizing said terminals in a certain order, the said means operating to produce instants of interruption of energization for a time interval less than the interval of fatigue of the human eye.

In testimony whereof I hereto affix my signature in presence of two witnesses.

ANTON LASZLO.

Witnesses.

HENRY HASPER,
WOLDEMAR HAUPT.